Assignment No.4

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Question taken from

linear_form, exercises 2.3,i,j

1 QUESTION No 1

Draw the graphs of the following equations

$$a) \begin{pmatrix} 1 & 1 \end{pmatrix} \mathbf{x} = 0 \tag{1.0.1}$$

$$b) \begin{pmatrix} 1 & -1 \end{pmatrix} \mathbf{x} = -2 \tag{1.0.2}$$

2 SOLUTION

a) let $\mathbf{x} = \begin{pmatrix} a \\ 0 \end{pmatrix}$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} a \\ 0 \end{pmatrix} = 0 \tag{2.0.1}$$

$$\implies a = 0 \tag{2.0.2}$$

similarly let $\mathbf{x} = \begin{pmatrix} 0 \\ b \end{pmatrix}$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} 0 \\ b \end{pmatrix} = 0 \tag{2.0.3}$$

$$\implies b = 0 \tag{2.0.4}$$

$$\mathbf{P} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{2.0.5}$$

For point $\mathbf{Q}$,

let $\mathbf{x} = \begin{pmatrix} x \\ y \end{pmatrix}$

$$\begin{pmatrix} 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = 0 \tag{2.0.6}$$

$$\implies x = 2 \tag{2.0.7}$$

$$\implies y = 6 \tag{2.0.8}$$

intercept on X and Y axis can be written as

$$\mathbf{P} = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \mathbf{Q} = \begin{pmatrix} 2 \\ 6 \end{pmatrix} \tag{2.0.9}$$

b) let $\mathbf{x} = \begin{pmatrix} a \\ 0 \end{pmatrix}$

$$\begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} a \\ 0 \end{pmatrix} = -2 \tag{2.0.10}$$

$$\implies a = -2 \tag{2.0.11}$$

similarly let $\mathbf{x} = \begin{pmatrix} 0 \\ b \end{pmatrix}$

$$\begin{pmatrix} 1 & -1 \end{pmatrix} \begin{pmatrix} 0 \\ b \end{pmatrix} = -2 \tag{2.0.12}$$

$$\implies b = -2 \tag{2.0.13}$$

intercept on X and Y axis can be written as

$$\mathbf{A} = \begin{pmatrix} -2 \\ 0 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 0 \\ -2 \end{pmatrix} \tag{2.0.14}$$
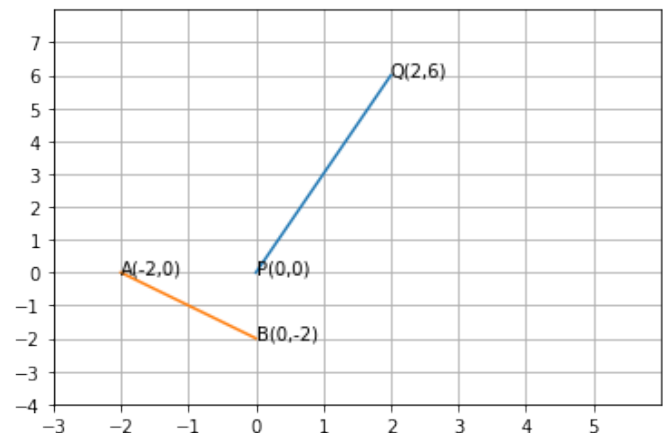
Graphs of the equations (a) and (b) are constructed by using python as

Fig. 2.1: Graphs of Equations (a) and (b)